PATENT ABSTRACTS OF JAPAN

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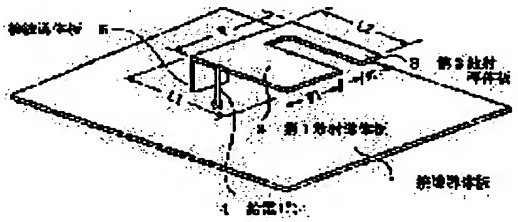
(54) DUAL RESONANCE INVERTED-F SHAPE ANTENNA

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain the small sized and low height dual resonance inverted-F shape antenna that is able to be resonant with a plurality of frequencies by providing a planer radiation plate having a plurality of radiation conductor plates, a feeding pin and a connection conductor plate that connects the radiation plates to a ground conductor plate to the antenna.
SOLUTION: The antenna comprises a ground conductor plate 1 acting like the earth, a radiation plate consisting of a 1st radiation conductor plate 2 and a 2nd radiation conductor plate 3 arranged on the ground conductor plate 1 at a prescribed interval, a connection conductor plate 5 connecting the radiation plate and the ground conductor plate 1, and a feeding pin 4 penetrated through the ground conductor plate 1 to supply high frequency power to the radiation plate. Furthermore, the feeding pin is an extension of a center conductor of a coaxial connector provided to the backside of the ground conductor plate 1. Then a slit is made to one flat conductor plate to form the 1st radiation conductor plate 2 whose width is W1 and whose length is L1 and the 2nd radiation conductor plate 3 whose width is W2 and whose length is L2 and the connection conductor plate 5 is formed by folding part of the radiation plate.



LEGAL STATUS

[Date of request for examination] 28.07.2003

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CLAIMS

[Claim(s)]
[Claim 1] grounding -- a conductor -- two or more radiation which resonates to frequency which predetermined interval isolation is carried out, is arranged on a board, and is different, respectively -- a conductor -- the radiation board and this radiation board of a plane equipped with a board -- the aforementioned grounding -- a conductor -- the electric-supply pin which penetrates a board and supplies RF power, and the aforementioned radiation board -- the aforementioned grounding -- a conductor -- the connection linked to a board -- a conductor -- the double resonance reverse female mold antenna characterized by to have a
[Claim 2] two or more aforementioned radiation -- a conductor -- the double resonance reverse female mold antenna according to claim 1 characterized by forming the board by forming a slit in the aforementioned radiation board

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the reverse female mold antenna of the small and the low profile used for mobile communications etc.
[0002]
[Description of the Prior Art] In the mobile communications machine or the field radio, since to make a transmitter lightweight small is desired, the antenna of small and a low profile is demanded as an antenna. The reverse female mold antenna is known as this kind of an antenna. Although a reverse female mold antenna is an antenna of single resonance theoretically, if it can be used on two or more frequency as a transmitter, the reverse female mold antenna which can be used on two or more frequency is proposed from the application range spreading.
[0003] The conventional example of composition of this double resonance reverse female mold antenna is shown in drawing 7 . grounding with this big double resonance reverse female mold antenna -- a conductor -- a board 100 and grounding -- a conductor -- the 1st radiation which predetermined interval isolation was carried out and has been arranged on a board 100 -- a conductor -- with a board 101 the 1st radiation -- a conductor -- the 2nd radiation which predetermined interval isolation was further carried out and has been arranged on a board 101 -- a conductor -- with a board 102 the 1st radiation -- a conductor -- a board 101 and the 2nd radiation -- a conductor -- a board 102 -- grounding -- a conductor -- the connection linked to a board 100 -- a conductor -- a board 103 and the 1st radiation -- a conductor -- a board 101 and the 2nd radiation -- a conductor -- it consists of electric supply pins 104 which supply RF power to a board 102
[0004] this double resonance reverse female mold antenna -- setting -- the electric supply pin 104 -- the 1st radiation -- a conductor -- a board 101 and the 2nd radiation -- a conductor -- the RF power which is connected to the board 102 and has spread the electric supply pin 104 -- the 1st radiation -- a conductor -- a board 101 and the 2nd radiation -- a conductor -- a board 102 is supplied simultaneously the 1st radiation -- a conductor -- the 1st frequency it is decided from the length and width of face that a board 101 will be -- resonating -- **** -- the 2nd radiation -- a conductor -- a board 102 resonates in the 2nd frequency decided from the length and width of face moreover, the 1st radiation -- a conductor -- a board 101 and the 2nd radiation -- a conductor -- it is arranged so that operation with a mutual board 102 may not b affected
[0005] therefore -- if electric power is supplied to the RF power of the 1st frequency from the electric supply pin 104 -- mainly -- the 1st radiation -- a conductor -- an electric wave is emitted from a board 101 and -- if electric power is supplied to the RF power of the 2nd frequency from the electric supply pin 104 -- mainly -- the 2nd radiation -- a conductor -- an electric wave comes to be emitted from a board 102 Moreover, with this double resonance reverse female mold antenna, the 1st frequency of the above and the 2nd frequency can be received as a central-zone region, and the input signal can be supplied to a tuner etc. through the electric supply pin 104.
[0006]

[Problem(s) to be Solved by the Invention] although the reverse female mold antenna which resonates in two or more frequency can be offered in the conventional double resonance reverse female mold antenna -- the 1st radiation -- a conductor -- a board 101 top -- the 2nd radiation -- a conductor -- since it considers as the composition which piles up a board 102, the merit of the small and the low profile which is the feature of a reverse female mold antenna will be lost if it is going to resonate the frequency of three or more cycles especially -- further -- radiation -- since a conductor must be piled up, this demerit comes to appear notably
[0007] Then, this invention aims at offering the double resonance reverse female mold antenna of the small and the low profile which can resonate in two or more frequency.
[0008]
[Means for Solving the Problem] in order to solve the above-mentioned technical problem -- the double resonance reverse female mold antenna of this invention -- grounding -- a conductor -- two or more radiation which resonates to frequency which predetermined interval isolation is carried out, is arranged on a board, and is different, respectively -- a conductor -- the radiation board and this radiation board of a plane equipped with a board -- the aforementioned grounding -- a conductor -- the electric-supply pin which penetrates a board and supplies RF power, and the aforementioned radiation board -- the aforementioned grounding -- a conductor -- the connection linked to moreover, two or more aforementioned radiation -- a conductor -- the board is formed by forming a slit in the aforementioned radiation board
[0009] the radiation which resonates in two or more frequency according to such this invention -- a conductor -- since the board is made into the plane, it can consider as the reverse female mold antenna of small and a low profile also as a double resonance type moreover, the thing for which a slit is formed in the radiation board of a plane -- two or more radiation -- a conductor -- since a board can be formed, a reverse female mold antenna can be produced easily and it can consider as the reverse female mold antenna excellent in mass-production nature
[0010]
[Embodiments of the Invention] the composition of the 1st of the form of operation of the double resonance reverse female mold antenna of this invention is looked like [drawing 1 and drawing 2], and is shown Drawing 1 is the perspective diagram of the double resonance reverse female mold antenna of this invention, and drawing 2 is the front view. As shown in drawing 1 and drawing 2, the 1st double resonance reverse female mold antenna of this invention grounding which performs the duty of the ground -- a conductor -- a board 1 and grounding -- a conductor -- the 1st radiation which predetermined interval isolation was carried out and has been arranged on a board 1 -- a conductor -- a board 2 and the 2nd radiation -- a conductor -- with the radiation board which consists of a board 3 a radiation board and grounding -- a conductor -- the connection which connects a board 1 -- a conductor -- grounding which supplies RF power to a board 5 and a radiation board -- a conductor -- it consists of electric supply pins 4 prepared by penetrating a board 1 in addition, this electric supply pin 4 -- grounding -- a conductor -- the central conductor of the coaxial connector 6 prepared in the rear face of a board 1 is extended
[0011] thus, the conductor of one sheet plate-like in the 1st double resonance reverse female mold antenna of the constituted this invention of width of face W -- forming a slit in a board -- the 1st radiation of width of face W1 and length L1 -- a conductor -- the 2nd radiation of a board 2, and width of face W2 and length L2 -- a conductor -- bending a part, while creating a board 3 -- connection -- a conductor -- it is made to form a board 5 When using this double resonance reverse female mold antenna as a transmitting antenna, RF power is supplied from a connector 6. this RF power -- the electric supply pin 4 -- minding -- the 1st radiation -- a conductor -- a board 2 is supplied -- having -- further -- the 1st radiation -- a conductor -- a board 2 and the 2nd radiation -- a conductor -- a connection with a board 3 -- minding -- the 2nd radiation -- a conductor -- a board 3 is supplied
[0012] at this time, the current which flows to a radiation board is shown in drawing 5 (b) -- as -- the 1st radiation -- a conductor -- a board 2 and the 2nd radiation -- a conductor -- it branches to a board 3 and comes to flow and the 1st radiation -- a conductor -- with a board 2, it resonates to the 1st resonance frequency determined with the width of face W1 and length L1,

and an electric wave is emitted moreover, the 2nd radiation -- a conductor -- with a board 3, it resonates to the 2nd resonance frequency determined with the width of face W2 and length L2, and an electric wave is emitted Therefore, the double resonance reverse female mold antenna shown in drawing 1 and drawing 2 comes to operate as 2 resonant antennas. without wanting to be careful branches here so that it may illustrate in this case although the antenna which formed the slit in the radiation board is known as conventionally shown in drawing 5 (a) -- current -- flowing -- three radiation -- a conductor -- 2- 1, 2-2, and 2-3 are connected in series electrically therefore, this antenna -- setting -- radiation -- the length of a conductor becomes long (resonance frequency becomes low), and does not serve as an antenna which resonates in two or more frequency Thus, although the configuration where it glanced at the antenna shown in drawing 5 (a) is alike, the double resonance reverse female mold antenna of this invention is an antenna with which the operation also completely differs also from an electrical property.
[0013] the double resonance reverse female mold antenna of this invention -- for example, W= 19mm L 2= 36mm and a radiation board, and grounding -- a conductor -- when it considers as the interval of H= 9mm with a board 1, an antenna property as shown in drawing 6 (a) and (b) can be acquired [W 1= 9mm] [L 1= 37mm] [W 2= 2.5mm] the graph with which drawing 6 (a) shows a frequency pair voltage standing wave ratio (VSWR) property -- it is -- the 1st radiation -- a conductor -- the good VSWR value of about 1.7 obtains in the 1500MHz of the 1st resonance frequency which is the resonance frequency of a board 2 -- having -- the 2nd radiation -- a conductor -- the good VSWR value of about 1.6 is acquired in the 1900MHz of the 2nd resonance frequency which is the resonance frequency of a board 3 Moreover, drawing 6 (b) shows the Smith chart which shows a feeding point impedance, and the with an absolute value [of about 56 ohms] feeding point impedance is obtained in the 1900MHz of the 2nd resonance frequency. in addition, the impedance of a double resonance reverse female mold antenna -- the electric supply pin 4 and connection -- a conductor -- distance with a board 5 and a radiation board, and grounding -- a conductor -- it is mainly determined by the interval H with a board 1
[0014] Next, other examples of the double resonance reverse female mold antenna of this invention are shown in drawing 3 (a) and (b). the 2nd double resonance reverse female mold antenna of this invention shown in drawing 3 (a) -- connection -- a conductor -- it is located in both sides centering on a board 5 -- as -- the 1st radiation -- a conductor -- a board 2 and the 2nd radiation -- a conductor -- it is made to form a board 3 this 2nd example -- the 1st radiation -- a conductor -- a board 2 and the 2nd radiation -- a conductor -- since the board 3 is isolated, it comes to be hard to affect the operation mutually In addition, about an electrical property, it becomes being almost the same as that of the 1st double resonance reverse female mold antenna shown in drawing 1 and drawing 2 . moreover, the 3rd double resonance reverse female mold antenna of this invention shown in drawing 3 (b) -- the 1st double resonance reverse female mold antenna -- further -- the 3rd radiation -- a conductor -- a board 7 is added according to this 3rd example -- the 1st resonance frequency and the 2nd resonance frequency -- in addition, the 3rd radiation -- a conductor -- a double resonance reverse female mold antenna can be made to have the 3rd resonance frequency to which a board 7 resonates
[0015] Furthermore, other examples of the double resonance reverse female mold antenna of this invention are shown in drawing 4 . the modification of the 3rd double resonance reverse female mold antenna of this invention which shows the double resonance reverse female mold antenna of this invention shown in drawing 4 to drawing 3 (b) -- it is -- the 1st double resonance reverse female mold antenna -- further -- the 3rd radiation -- a conductor -- a board 7 is added according to this 3rd example -- the 1st resonance frequency and the 2nd resonance frequency -- in addition, the 3rd radiation -- a conductor -- a double resonance reverse female mold antenna can be made to have the 3rd resonance frequency to which a board 7 resonates in addition, the double resonance reverse female mold antenna of this invention -- setting -- 2 resonance or not only 3 resonance but the 4th radiation -- a conductor -- a board and the 5th radiation -- a conductor -- the double resonance reverse female mold antenna of 4 or more ****s can be obtained by adding a board and ...
[0016] moreover, the double resonance reverse female mold antenna of this invention of this invention -- each -- a reversible antenna -- it is -- the 1st radiation -- a conductor -- a board

2 or the 3rd radiation -- a conductor -- the electric wave received with the board 7 is supplied to a tuner etc. through the electric supply pin 4 as an electrical signal

[0017]

[Effect of the Invention] the radiation which resonates in two or more frequency since this invention is constituted as mentioned above -- a conductor -- a board can be made into a plane and it can consider as the reverse female mold antenna of small and a low profile also as a double resonance type moreover, the thing for which a slit is formed in one radiation board of a plane -- two or more radiation -- a conductor -- since a board can be formed, an antenna can be produced easily and it can consider as the antenna excellent in mass-production nature

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective diagram showing the composition of the form of operation of the 1st double resonance reverse female mold antenna of this invention.
[Drawing 2] It is the front view showing the composition of the form of operation of the 1st double resonance reverse female mold antenna of this invention.
[Drawing 3] It is the perspective diagram showing the composition of the form of operation of the 2nd double resonance reverse female mold antenna of this invention, and the 3rd double resonance reverse female mold antenna of this invention.
[Drawing 4] It is the perspective diagram showing the composition of the modification of the 3rd double resonance reverse female mold antenna of this invention.
[Drawing 5] It is drawing for explaining how depending on which the current in the 1st double resonance reverse female mold antenna of this invention flows, and how depending on which the current of the conventional antenna flows.
[Drawing 6] They are a VSWR property in the 1st double resonance reverse female mold antenna of this invention, and drawing of a Smith chart showing a feeding point impedance.
[Drawing 7] It is the perspective diagram showing the composition of the conventional double resonance reverse female mold antenna.
[Description of Notations]
1 Grounding -- Conductor -- Board
2 1st Radiation -- Conductor -- Board
3 2nd Radiation -- Conductor -- Board
4 Electric Supply Pin
5 Connection -- Conductor -- Board
6 Connector
7 3rd Radiation -- Conductor -- Board

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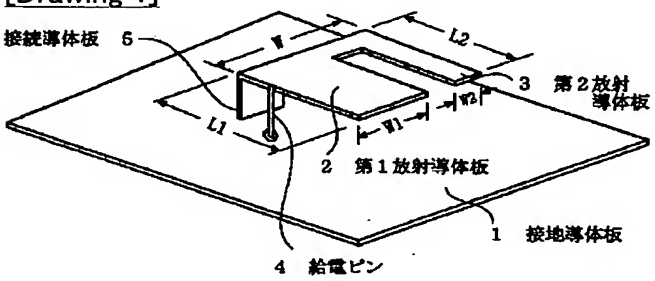
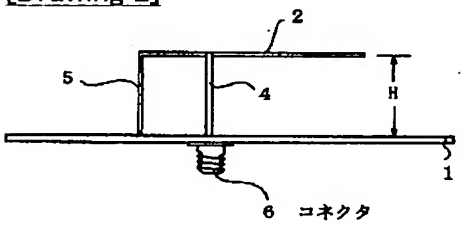
DRAWINGS

[Drawing 1]



[Drawing 2]



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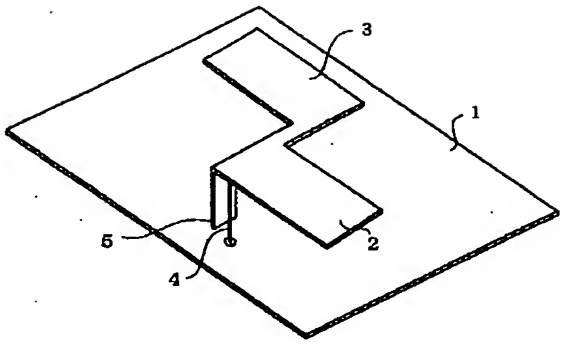
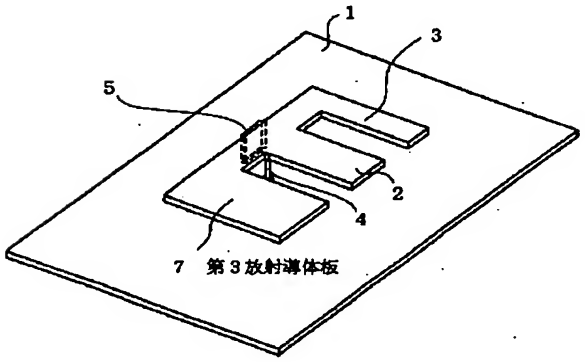
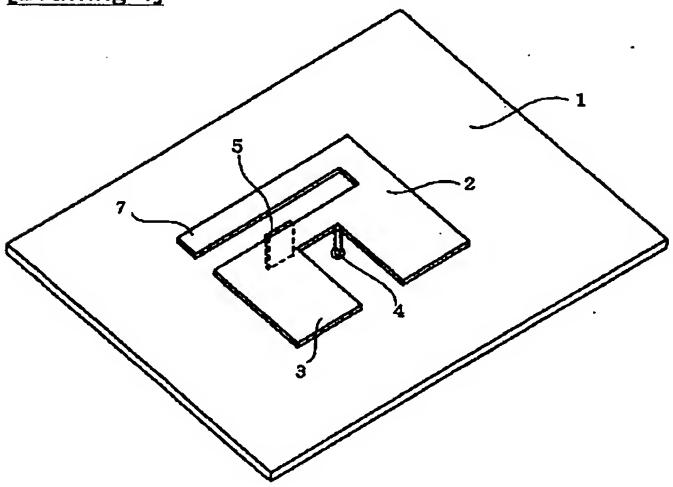


(a)



(b)

[Drawing 4]



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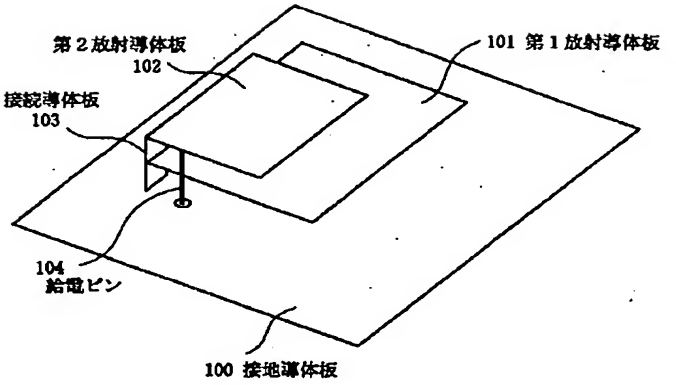

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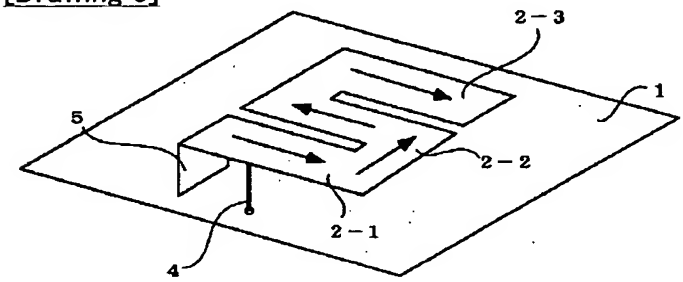

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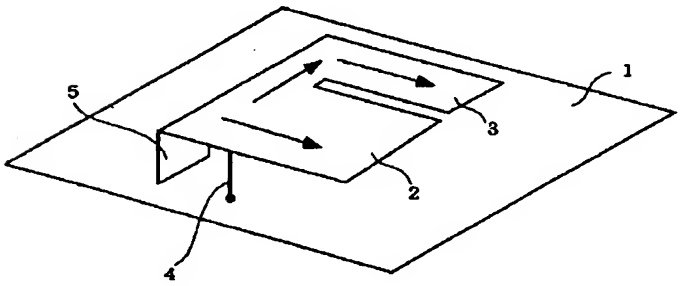
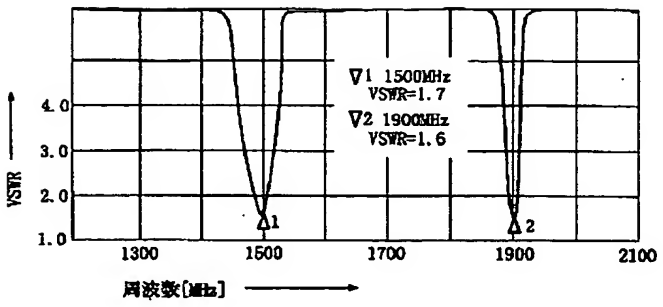


(b)

[Drawing 6]



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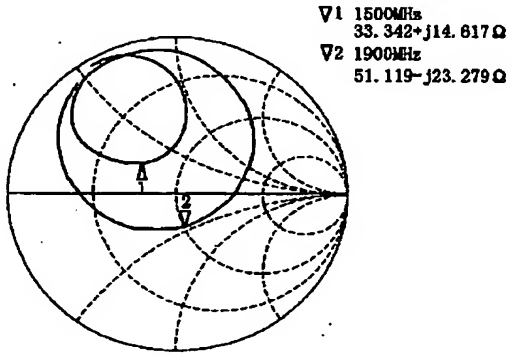

(b)

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